

## **Chronic Kidney Disease in the Dog**

Chronic kidney disease is a relatively common disorder in dogs, especially geriatric dogs, although it can occur in young dogs. It occurs when the kidneys are no longer able to perform their normal function of removing waste products from the blood. This is not the same as the inability to make urine. In fact, most dogs with renal disease are producing large volumes of urine. This disparity between the large volume of urine produced and declining kidney function are often a source of confusion for owners.

Typically, chronic kidney disease comes about as the kidneys undergo aging changes and begin to "wear out." It is a process that develops over months to years. Initially, there may be no apparent signs and the dog's bloodwork is normal. However, there are irreversible microscopic changes underway in the aging kidney. Eventually, the kidneys will begin to shrink because of scar tissue and will become small and hard. By this time, there are usually signs of progressive kidney disease and the labwork will indicate associated changes.

The kidneys are nothing more than filters which selectively keep certain compounds in the blood, while allowing unnecessary waste products to escape into the urine. When aging causes the filtration process to become progressively less effective, blood flow to the kidneys increases in an attempt to improve filtration. This is the reason that the dog with kidney disease is producing a large volume of urine. Because of the loss of excessive fluid through the urine, the dog is obligated to drink more water to avoid becoming dehydrated. This is called a *compensatory change*.

Thus, the early clinical signs of kidney disease are increased water consumption (polydipsia) and increased urine production (polyuria).

### **Contributing Factors**

Infection in the urinary tract, toxic substances, and kidney stones can be a primary cause of kidney disease or can lead to deterioration of function in previously diseased kidneys. However, in many cases of advanced chronic kidney disease, the underlying disease cannot be determined.

### **Prevalence**

Various clinical studies have evaluated the prevalence of renal disease in dogs. For most dogs, onset of clinical signs begins anywhere from 7-12 years of age. However, the prevalence of overt kidney disease is highest in dogs older than twelve years of age. One study found that approximately 30% of dogs over 12 years of age had chronic renal disease.

The frequency of renal disease in male dogs is essentially the same as for female dogs.

Renal disease in young dogs is most likely due to a congenital defect in the structure of the kidneys. A number of breeds are at risk for juvenile kidney disease; these include the Shih Tzu, Samoyed, Doberman pinscher, Shar Pei, Lhasa Apso, and Basenji.

### **Causes/Transmission**

In most cases, a specific cause cannot be identified. A number of infectious, inflammatory, or neoplastic (cancerous) conditions can lead to kidney disease in the dog.

### **Clinical Signs**

As described above, the classic signs of kidney disease are increased urine output and a compensatory increase in water intake (thirst). The clinical signs of more advanced kidney disease include loss of appetite, weight loss, depression, vomiting, diarrhea, and very bad breath. Occasionally, ulcers will be found in the mouth. When kidney disease is accompanied by these clinical signs, it is called "uremia." In effect, this means "urine in the blood." High blood pressure (hypertension) occurs in a large number of dogs with chronic renal disease. This can only be diagnosed with measurement of the dog's blood pressure.

For most small dogs, the early signs occur at about 10-14 years of age. However, large dogs have a shorter age span and may develop kidney disease as early as 7 years of age. For dogs with congenital kidney disease, signs usually occur by 2 years of age.

## **Diagnosis**

The diagnosis of kidney disease is made by determining the level of two waste products in the blood: blood urea nitrogen (BUN) and creatinine. In addition, the blood phosphorus level in the blood may increase as the kidneys cannot eliminate excess phosphorus from your dog's diet. A urinalysis is also needed to complete the study of kidney function.

Although BUN and creatinine levels reflect kidney disease, they do not predict it. A dog with marginal kidney function may have normal blood tests. If that dog is stressed with major illness or surgery, the kidneys may fail, sending the blood test values up quickly.

## **Treatment**

Treatment occurs in two phases.

### **Phase 1 - Diuresis.**

In the first phase of treatment, large volumes of intravenous fluids are given in an attempt to flush toxins from the body. This flushing process, called diuresis, is designed to maximize the function of all remaining kidney tissue. If enough functional kidney cells remain, they may be able to adequately meet the body's needs for waste removal, with the help of this additional fluid. Also, the fluid therapy helps to replace various electrolytes, especially potassium. Other important aspects of initial treatment include proper nutrition and drugs to control vomiting and diarrhea.

Unfortunately, there are no reliable tests that will predict the outcome of this first phase of treatment. We hope that intensive fluid therapy will substantially decrease the blood levels of BUN, creatinine and Phosphorus. If there is no improvement after several days of fluid therapy, the prognosis is more guarded than for dogs who show significantly decreased values.

### **Phase 2 - Ongoing medical therapy.**

The second phase of treatment is designed to maximize the remaining function of the diseased kidneys. This is accomplished with one or more of the following, depending on the situation:

1. A low protein, low phosphorous, low sodium diet. This helps to keep the blood tests as close to normal as possible. This improvement in the bloodwork often correlates with improvement in the way the dog feels. There are commercially prepared foods that have the quantity and quality of protein needed by your dog. The new diet should be introduced gradually over a few weeks because of the lowered sodium content.
2. A phosphate binder. As the filtering ability of the kidneys declines, phosphorous begins to accumulate in the blood. High serum phosphorous contributes to depression and anorexia. Certain drugs will bind excess dietary phosphorous in the intestine so that less is available for absorption.
3. Fluids given at home. After your dog has completed a course of intravenous fluid therapy in the hospital, fluid may need to be given at home. The fluid is dripped under the skin, or subcutaneously. This serves to continually "restart" the kidneys as their function continues to decline. This is done once daily to once weekly, depending on the severity of kidney disease. This technique is easily mastered by most owners so don't be afraid to consider this very helpful option.
4. A drug to regulate the parathyroid gland and calcium levels. Calcium and phosphorus must remain at about a 2:1 ratio in the blood. The increase in blood phosphorus level, as mentioned above, stimulates the parathyroid gland to increase the blood calcium level by removing it from bones. This can be helpful for the sake of the normalizing calcium:phosphorus ratio, but it can make the bones brittle and easily broken. Calcitriol can be used to reduce the function of the parathyroid gland and to increase calcium absorption from the intestinal tract.

5. For dogs with confirmed high blood pressure (hypertension), medication may need to be administered.
6. Stressful situations, such as boarding, should be avoided as these can precipitate a crisis with declining kidney function.

### **Prognosis**

The prognosis is quite variable depending on response to the initial stage of treatment and your ability to perform the follow-up care.

### **Prevention**

For the most part, kidney disease is not a preventable disease. It occurs as a consequence of aging.